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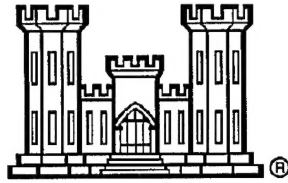
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**United States
Army Corps of Engineers**

**INFORMATION TECHNOLOGY/ INFORMATION MANAGEMENT
(IT/IM) STRATEGIC PLAN
(Version 1.0)**

for

**FISCAL YEARS
1998 - 2003**

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Information technology is not an invisible commodity. It is a resource elemental to an organization's business success.

**January 1998
Headquarters, U.S. Army
Corps of Engineers**

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Message from the Chief Information Officer

Through the Chief of Engineers' leadership, a strategic vision and master strategy have been defined. This vision, with its master strategy and associated goals, will strengthen Corps image as a world-class, premier engineering organization committed to delivering quality products and services to its customers and for ensuring a high-performing workforce to serve the Nation and the Army well into the 21st century.

Information technology (IT) has played, and will continue to play, a significant role in the accomplishment of the Corps' strategic business goals. It is absolutely vital that information resource management professionals and business process managers partner together to find better ways of bringing current and emerging information technologies together to improve the Corps' operational and support missions. We have had our successes, such as the Corps of Engineers Automation Plan (CEAP) which created a robust, state-of-the-art global communications network with regional data processing centers, but we must strive for more if we are to create an electronic workplace environment that supports workers both "inside the building and beyond its walls."

The Clinger-Cohen Act of 1996 mandates that we improve our day-to-day mission processes, which are heavily information dependent, and use IT properly to support those improvements. IT and automated information system (AIS) investment sponsors must be accountable to the Corps "chain-of-command" for achieving the results-based benefits they promised. We must tie IT investments back to the Corps' mission performance.

This plan charts a strategic direction for USACE to pursue and is not about identifying specific information technologies. It introduces a "roadmap" to guide improvements in the Corps' business processes and IT infrastructure, and for managing change. The execution of this plan requires the commitment to work together towards our shared USACE goals. All USACE organizational elements must ensure that planned IT or AIS initiatives are in conformance with this plan.

Success will require continuous cooperation, coordination and refinement as well as a strong commitment to openness and trust. Together, we, the business process manager and IT professional, have the opportunity to make a difference; and I urge your support.

COL Donald J. Whitten

Executive Summary

It is the Corps' vision to be the world's premier engineering organization... trained and ready to provide support anytime, anyplace. To achieve this vision, and meet the challenges of the future, USACE has developed three ambitious goals to enable it to operate more successfully and efficiently. An important foundation component of USACE's strategic plan is the "innovative use of information technology" to revolutionize its business environment.

"To achieve our Vision and get out in front of the changes required by technology and the future realities, we must strike out boldly... Success will come from a carefully sculpted, aggressive plan."

Lieutenant General Joe N. Ballard,
Commander
U.S. Army Corps of Engineers

To help managers and employees at every level better understand this corporate foundation component, as well as their role in helping achieve the innovative use of IT, the USACE Chief Information Officer (CIO) has prepared this plan. The plan directly supports, and is issued as an "addendum" or "supplement" to the *USACE Strategic Vision/Master Strategy (Corps Plus)*. The plan provides important information on a strategic direction to improve the USACE IT infrastructure, support future planning, promote a common work environment, encourage the transparent sharing of information, and protect information. As a blueprint for the Corps strategic IT direction, the plan serves as a framework for developing specific information management (IM) initiatives and operational plans for all USACE organizational elements... from HQUSACE to project office.

Customer service and satisfaction, as well as Corps mission and program performance, are the foundation of the goals developed for this plan. Critical to the formulation of the goals is an IT/IM Architecture, which is itself an important element of USACE's information management strategy. This Architecture provides a management and technology framework that supports: (1) business decision making; (2) mission and program performance monitoring; (3) information sharing; and (4) a basic structure for organizing information, applications, and technology components and their interrelationships. Also, the IT/IM Architecture establishes the principles and guidelines that govern planning and implementing automated information systems (AISs). Information technology initiatives, AISs, and business process improvements fitting with this framework guarantee the best management of information and changes to the USACE IT environment. Information management crosscuts all business and programmatic functions and is a shared responsibility between executive management, business process/unit managers, and the IT professional community-- both inside and outside the IM organization.

IT Strategic Planning Process

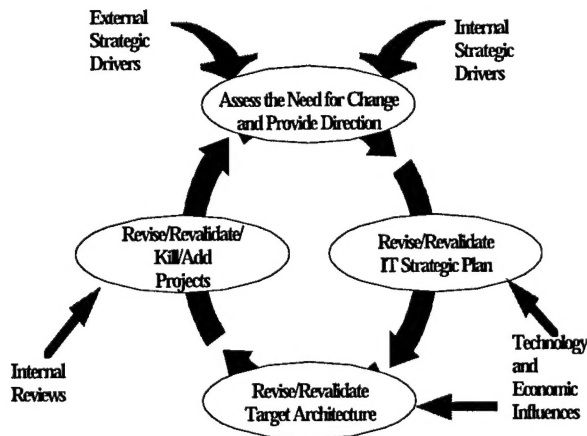


Figure 1

IT Strategic Planning Process. Planning for the effective and efficient use of information technology within USACE is not a “once and done” activity. IT strategic planning is part of an overall deliberate planning process that links sound information technology investments to maximized USACE employee performance and customer satisfaction. (See Figure 1)

Figure 2 identifies the USACE IT/IM Architecture and the strategic goals associated with it.

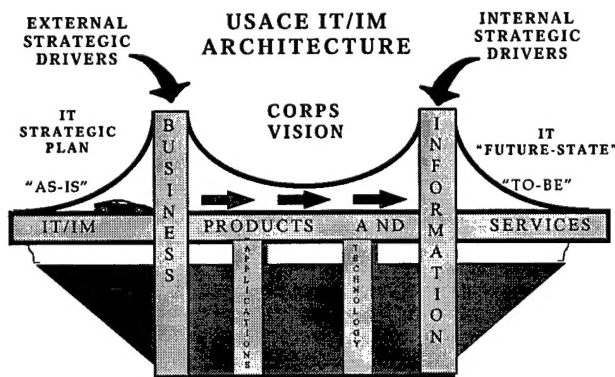


Figure 2

IT/IM Goals.

- Satisfy internal and external customer information needs.
- Plan for the future, not current, use of information technology.
- Be cost-effective.
- Provide a common working environment.
- Transparently share information.
- Protect information.

The IT/IM Strategic Plan and the IT/IM Architecture are essential components of the IT Strategic Planning Process.

The Paperwork Reduction Act of 1995 and the Information Technology Management Reform Act (ITMRA) of 1996 mandate changes to significantly improve the way the Federal government acquires and manages information technology. Agencies have the clear authority and responsibility to make measurable improvements in mission and program performance and delivery of services to the public through the strategic application of information technology. The ITMRA created a direct link to the Government Performance and Results Act of 1993 and requires agencies to integrate IT planning with the agency’s strategic business planning and to identify quantitatively the cost-benefit of their IT investments to program performance.

IT/IM Strategic Plan

I. Introduction. The Federal agencies have been mandated to significantly improve the way they acquires and manages information technology. Under public law, agencies have the clear authority and responsibility to make measurable improvements in mission and program performance and delivery of services to the public through the strategic application of information technology. Agencies must integrate IT planning with their strategic business planning and identify quantitatively the cost-benefit of their IT investments to improvements in program performance.

“Because IT is such a significant force multiplier for improving mission accomplishment, business process managers and IT professionals must establish working partnerships to maximize the return on the IT investment.”

Colonel Donal J. Whitten
Chief Information Officer

This IT/IM Strategic Plan complies with requirements set forth in the Paperwork Reduction Act of 1995 as well as the Information Technology Reform Act (Clinger-Cohen Act) of 1996. This plan is intended for use by USACE executive managers, business process/unit managers, automated information system (AIS) or IT initiative sponsors, and IT professionals for implementing strategic, tactical and operational solutions that will benefit mission performance and USACE customers. The plan encourages collaboration between the information management community, its stakeholders (e.g., the business process/unit managers), and internal and external customers to achieve the plan's goals. The ultimate success of the plan will depend upon how well this collaboration takes place.

II. Information Management (IM) Mission Environment.

A. IM Mission. The IM mission is to provide USACE employees and contractors with the capability to readily acquire, store, share, use, disseminate, and protect the information needed to successfully accomplish their jobs, and to acquire and sustain an IT environment that supports USACE business strategies and goals while improving mission performance and customer satisfaction.

With this mind, the USACE will focus on a strategic direction that capitalizes on an **Information Technology Environment (ITE)** where information is created once, managed effectively, and used often-- in innovative ways never before imagined such as with three dimensional images of a project where real-time adjustments can be made and “what if questions” answered. The ITE will evolve over time to create an electronic work place free from time and distance constraints and allow individuals and teams to work independently or collaboratively. In essence, the ITE will become a catalyst for cultural change and a seamless electronic network connecting Corps team members, customers, and vendors and suppliers to improve relations and access information repositories and image libraries.

B. Corporate Management Approach for Leveraging IT. The Corps corporate management approach is to centralize all IT program related functions (*oversight, policy formulation, technical direction, planning, systems development and acquisition, and information technology environment operational management*) under the Chief Information Officer (CIO). This management approach provides for the evolutionary migration of new technology and promotes common working environments across USACE through the use of standard data elements and uniform guidance on hardware and software platforms, while still leveraging Corps decentralized management culture. This framework also recognizes and encourages organizations (and individuals) to contribute innovative information technology solutions that fit within the framework of the USACE IT/IM Architecture and *the IT investment portfolio management concept* (discussed later on in the plan).

III. Business and Technology Environments.

A. Business Environment. USACE is a multi-mission oriented organization characterized by its support to the Nation through its Civil Works (CW) Program, to the Departments of the Defense (DoD) and Army (DA) by its Military Construction and Real Estate Programs, and to the public through its research and development efforts. To accomplish its assigned missions and programs, the USACE is hierarchically organized with a Headquarters, eight Major Subordinate Commands (MSCs) with four to five Districts under each MSC, two engineering centers, and four laboratories. Commanders and Directors are given wide latitude in how they can accomplish their missions, programs, and projects within their geographic boundaries with the resources they are allocated. The Corps current civilian manpower end-strength is approximately 36,250 spaces. USACE missions and programs, particularly the operations and maintenance of its various CW programs/projects, directly or indirectly affect the health, welfare, and safety of millions of Americans every day.

The Corps five major, but largely independent, Civil Works business functions are Navigation, Hydropower, Environmental Stewardship, Recreation, and Flood Control. Its Military Construction business functions include Real Estate, Environmental Restoration, Base Realignment and Closure, and Installation Support. In both Civil Works and Military Construction, USACE performs the full range of engineering functions from studies to design, to construction management, to operations and maintenance. Its products include locks, dams, hydro electric power plants, recreational facilities, Air Force runways, Army barracks and family housing. USACE brings "steel and concrete up out of the ground."

B. Current IT Technical Environment. USACE spends 3 to 4 percent of its annual funding program on information management activities and information technology. For fiscal year (FY) 1997, USACE spent more than 337 million dollars for personnel, hardware, software, communications, service contracts, supplies and materials. It is anticipated that the Corps will spend about 300 million dollars in FY98. The Corps has an IM/IT professional workforce of approximately 575 people. As the Corps in-house IT workforce continues to shrink, more reliance will be placed upon contractor provided support. USACE has a

Director of Information Management (i.e., its Chief Information Officer (CIO)) and supporting staff at the Headquarters, with Directors and Chiefs of Information Management at subordinate organizational levels. More than 90% of the Corps IM/IT professional workforce is located in its Districts and Laboratories.

In 1989, USACE awarded a contract to the Control Data Corporation (CDC) as part of its Corps of Engineers Automation Plan (CEAP) to upgrade and modernize its data processing and data communications services. The USACE has two large scale, regional data centers (one in Vicksburg, MS, and the other in Portland, OR) and a world-wide backbone communications network that links all USACE organizations together. Tied to the backbone network are more than a hundred local area networks. At the Portland Regional Data Center, there is a E-Mail Hub which certifies all X.400 network operating systems in use and provides E-mail directory synchronization across the command.

CEAP provides the Corps' primary IT infrastructure, and promotes standardization, connectivity, and interoperability across USACE. In the late 1980's, the Corps developed Architecture 1995 which graphically identified the geotechnical environment for where applications and data were to be placed to optimize the delivery of information to various key business processes. In addition, the Corps launched its Information Systems Modernization Program (ISMP) to modernize the information systems most critical to its mission and program operations. CEAP, Architecture 1995, and ISMP form the current framework for "information delivery" to users and customers.

C. Future IT Technical Environment. For the near term, the Corps wide area communications network and large-scale computing capabilities will be retained and enhanced as part of the Departments of Defense, Army and the Nation's information highway networks infrastructure. However, information and data traffic over the Corps communications backbone network will continue to increase because of many factors that include:

- ◆ Internet/intranet capabilities significantly expanded to support access to information;
- ◆ Increase interoperability to a diverse and geographic dispersed Army, customer/vendor, and internal workforce;
- ◆ Sharing computer aided drafting and design (CADD) files;
- ◆ Geographic information system (GIS) data;
- ◆ Image/digital reference libraries;
- ◆ Virtual interaction and multimedia products; and,
- ◆ Increase network support to Directors of Public Works at Army installations.

Since mission and program execution is dependent upon the IT infrastructure being "up and running," security of the USACE information technology environment and its information/data assets will be enhanced to ensure all appropriate countermeasures have been implemented against vulnerabilities that would disrupt the day-to-day operations. To comply with statutory requirements, the appropriate management of the Corps electronic records,

including E-mail messages and webpages, will be woven into the fabric of all USACE information processes. A seamless integrated information technology environment will evolve for the exchange of electronic information-- in all its various media; e.g., voice, video, text, graphics, and images, even three dimensional objects accessed through webpages created using the Virtual Reality Modeling Language (VRML). The Corps communications network infrastructure will incrementally become more robust, with the additional bandwidth necessary to accommodate responsive delivery of mixed media information both to a stationary and mobile workstation environment. Future requirements for information will spur increased efforts to deliver the wealth of Corps' data in a timely manner, and in a readily accessible meaningful format to the right people. The demand for information will increase the need for web enabled applications and web-based information technologies. Through Command leadership and partnerships, critical information used in knowledge management, necessary to make strategic decisions and/or monitor organizational or program performance, will be identified. Command performance review measurements will be interactive and largely the by-product of information stored in data warehouses.

Data management, data element standardization, and data reuse will be emphasized for all USACE AISs, not just for ISMP systems. The principle of data entered at its source, and only once, will continue to be of importance in the design and modernization of AISs. The number of USACE unique AISs will be minimized, and the acquisition of commercial-off-the-shelf (COTS) products and adaption of DoD/Army AISs will be the norm for management, business, and administrative operations. All AIS development will be done through an incremental, modular development strategy using industry recognized software engineering techniques. Information technology acquisitions at all organizational levels will closely adhere to the USACE IT/IM Architecture and Joint Technical Architecture-Army (JTA-A).

Innovative approaches for providing IT training to all Corps team members will be aggressively pursued. Information technology itself will provide the venue for improving the knowledge, skills and competencies of the total workforce. Within the IT community, certification requirements will be promoted to assure the continued availability of a high caliber, multi-disciplinary cadre of IT professionals.

In terms of the overall USACE IT management, the establishment of a Chief Information Officer, with its attendant roles and responsibilities, will be integrated into the Corps organizational structure-- beginning at the Headquarters and extending down to the District. HQUSACE imposed IT policy and regulatory requirements will be held at a minimum and flexible enough to allow rapid response, fast track delivery of prototypes and services. However, all IT investment decisions must be systematically evaluated using *IT investment portfolio management concept* practices to assure that the IT investment returns the value promised by its sponsor.

IV. Corporate IT/IM Goals, Objectives and Strategies. Corporate IT/IM goals, objectives and strategies have been defined to allow for flexible implementation across

USACE. Corporate IT Goals describe areas of major change to support and realize the Chief of Engineers' Vision. Corporate Objectives characterize broad actions to pursue each goal and should be measurable. Strategies are approaches that when implemented assist in achieving goals and objectives.

Each organizational level is expected to identify specific objectives that will support Corporate IT Goals. Corporate IT Initiatives that support the accomplishments of Corporate Objectives are stated in Appendix B. Each Corporate Goal directly supports the Chief of Engineers' goals and sub-strategies, as stated in the U.S. Army Corps of Engineers Strategic Vision.

A. Goal 1: Satisfy Internal & External Customer Information Needs.

This goal supports the Corps' Goal to Revolutionize Effectiveness, and the following Sub-strategies: Align for Success, Satisfy the Customer, and Build the Team.

A.1 Objectives:

A.1.1 Develop capability to identify information needs and expectations.

A.1.2 Establish priority of customer information needs.

A.1.3 Develop and implement business driven IT solutions.

A.1.4 Establish partnerships between IM organizations and internal customers. Partner with USACE business and program managers in planning and implementing innovative IT solutions. Partner with internal customers to develop information management policies and procedures.

A.1.5 Increase internal customers' commitment and trust by involving them in the information management process.

A.1.6 Develop mechanisms to measure internal and external customer satisfaction.

Business process and program managers must be assured that they have a partner in their information management community that will work with them to achieve their business or information requirement solutions. It is also vital that senior managers with business area programmatic responsibilities be directly involved in prioritizing and selecting information technology initiatives.

All information is corporate information in USACE. The ability to obtain and share information is a major requirement in the Corps decentralized environment. Consequently, it is imperative that the IM community work together and provide leadership with the business and

programs management community, when creating and implementing IT solutions.

The movement towards using DoD, Army, and USACE standard AISs is stronger than ever, with emphasis placed on those applications that support the USACE Vision and Master Strategy. The IM community needs to work with business process and program “owners” to design, develop, implement, and sustain applications that meet mission and program needs.

A.2 Strategies:

A.2.1 Form empowered internal customer groups to analyze, evaluate, and recommend IT investment initiatives.

A.2.2 Include internal customers in information management planning and budgeting processes.

A.2.3 Develop IT and IM action plans based on results of customer feedback.

B. Goal 2: Plan for the Future, not Current, Use of IT.

This goal supports the Corps’ Goals to Revolutionize Effectiveness and Seek Growth Opportunities, and the following Sub-strategies: Align for Success, Satisfy the Customer, Serve the Army, and Enhance Capabilities.

B.1 Objectives:

B.1.1 Establish both near-term (tactical) and long-term (strategic) IT objectives.

B.1.2 Improve the understanding of USACE missions, programs, and business processes in order to provide effective information management support.

B.1.3 Proactively use IT to reengineer business processes.

B.1.4 Infuse new information technology to improve business results.

Understanding USACE missions, goals, objectives, and business processes is fundamental to providing quality information management, IT infrastructure, and automated information systems support. There are two perspectives from which this understanding must occur: Corporate and programmatic. Each IM community in USACE must to be aware of their organization’s missions, goals, objectives and business processes in order to improve interoperability, coordination, and communications.

B.2 Strategies:



B.2.1 Make IT an early, integral part of the business planning cycle.

B.2.2 Plan and design for future, not current, capabilities.

B.2.3 Understand the organization's missions, programs, business processes and underlying information management strategy by being involved in developing the organization's operational plans that support the Corps Strategic Vision.

B.2.4 Whenever possible, use DoD and Army endorsed business process improvement methodologies, techniques, procedures and "tool sets."

C. Goal 3: Be Cost-Effective.

This goal supports the Corps' Goals to Revolutionize Effectiveness and Seek Growth Opportunities, and the following Sub-strategies: Satisfy the Customer and Serve the Army.

C.1 Objectives:

C.1.1 Leverage IT with business processes to improve productivity and reduce the cost of doing business.

C.1.2 Identify and capture all resource requirements and life cycle costs associated with significant IT investments.

C.1.3 Link all IT investments to business-driven requirements.

C.1.4 Develop an IT Investment Portfolio for each organization in USACE.

C.1.5 Measure IT Value-On-Investments (VOI) against business results achieved.

C.1.6 Establish an IT Investment Decision Review Board, composed of key business and program managers, to align current and future IT investments with higher authority policies, guidelines, and standards.

C.1.7 Improve the decision process for IT investments to ensure the commander's "chain-of-command" has the opportunity to make decisions for the organization.

C.1.8 Improve the USACE IT cost accounting procedures to better track and account for where its IT investment dollars are being spent.

C.2 Strategies:

C.2.1 Implement the IT Investment Portfolio Management Concept.

C.2.2 Evaluate IT investments in a portfolio, and create an action plan based upon the results of the analysis to make improvements and/or eliminate those IT investments that are not adding value or contributing to mission performance.

D. Goal 4: Provide a Common Working Environment.

This goal supports the Corps' Goals to Revolutionize Effectiveness and Invest in People, and the following Sub-strategies: Align for Success, Build Strategic Commitment, and Reshape Culture.

D.1 Objectives:

D.1.1 Develop a standard, WEB based environment, including intranet & extranet.

D.1.2 Use IT to enable a consistent way of doing business across the Corps and with external customers.

D.1.3 Develop information systems to have the same "look and feel" across USACE.

D.1.4 Establish and use IT/IM products and services by which the information management community, in partnership with business process/unit managers, can consistently plan, budget, and manage activities and resources.

D.1.5 Improve collaboration and cooperation of the information management community to effectively meet the information management requirements of USACE.

D.1.6 Improve the USACE-wide information technology planning process.

The information management community will continue to play an important and major role in assisting USACE to operate more effectively and economically. The USACE decentralized environment and culture requires that its IT professionals have the expertise necessary for USACE to manage its vast and valuable information assets. At every organizational level, an effective working team, with clear roles and responsibilities, must be forged that will allow the information management community to achieve the goals stated in this plan.

D.2 Strategies:

D.2.1 Use IT as the foundation for improving vertical and horizontal communications.

D.2.2 Use IT to support an electronic work flow environment.

D.2.3 Collaborate in addressing common issues based on clearly defined working relationships.

D.2.4 Guide information management and technology activities using the best business practices for successful organizations.

E. Goal 5: Transparently Share Information.

This goal supports the Corps' Goals to Revolutionize Effectiveness and Invest in People, and the following Sub-strategies: Align for Success, Satisfy the Customer, Build the Team, Build Strategic Commitment, and Reshape Culture.

E.1 Objectives:

E.1.1 Create a Corporate Database using consistently defined and implemented data elements.

E.1.2 Provide authorized user access to information repositories independent of the underlying information technology infrastructure and user location.

E.1.3 Consistently define, store and make available required information (data, text, graphics, drawing, imagery, audio and video) to USACE employees and selected customers.

E.1.4 Implement information systems that meet user-defined requirements for timely, accurate and up-to-date information.

E.1.5 Establish processes and procedures for information dissemination and push/pull technology.

E.1.6 Improve, in concert with the organization's business and program managers, the organization's data administration program to ensure data standardization, availability and access.

E.1.7 Provide authorized customers with the information technology to access and share information easily and seamlessly from any location.

Informed decision making depends upon good information, which assumes and depends upon, accurate and reliable data. As the IT/IM Architecture matures, it is critical that all USACE information be standards-based to ensure interoperability and shareability. USACE is committed to implementing a virtual workplace environment and for providing authorized access to information via personal computers to its workforce and its customers while at work, at home, after hours, on flexiplace, or on travel. This requires that data, regardless of storage media, be standardized. The Corps Data Administration Program requires a commitment at

every level to share data that is entered once and is available to anyone in the organization.

E.2 Strategies:

E.2.1 Increase business process and program manager involvement in populating and using the USACE Command Data Model and Data Encyclopedia.

E.2.2 Define and promote a corporate data warehouse environment.

E.2.3 Define and promulgate IT infrastructure interoperability standards.

E.2.4 Enhance computing and communications infrastructure based on defined standards.

E.2.5 Utilize configuration management practices to ensure the integration of emerging information technology components into the USACE IT infrastructure and for improving its operational capability.

F. Goal 6: Protect Information.

This goal supports the Corps' Goal to Revolutionize Effectiveness, and the Sub-strategy to Satisfy the Customer.

F.1 Objectives:

F.1.1 Make security an early and integral part of the entire IT planning cycle, not as an after-thought or add-on.

F.1.2 Prevent unauthorized or inadvertent access to or manipulation of USACE information.

F.1.3 Integrate IT solutions with user training to more effectively protect sensitive and classified information.

F.1.4 Provide customers with the information technology to access and share information easily and seamlessly from any location while maintaining information systems security.

F.2 Strategies:

F.2.1 Implement information systems security measures appropriate to safeguard USACE information resource assets.



F.2.2 Ensure the trustworthiness of USACE information with internal and external customers.

V. IT Investment Portfolio Management Concept. The General Accounting Office (GAO) has issued "*Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investments*" dated February 1997. This guide provides a systematic approach to manage the risks and returns of IT investments defined in the agencies IT Investment Portfolio for any of the agency's missions and/or programs.

An IT Investment Portfolio contains IT investments/projects in every phase (initial concept, development, or operations and support) and for every type (mission critical, cross-functional, infrastructure, administrative, and research and development) of IT. The Corps IT Investment Portfolio will collect and maintain data on IT projects (AISs), IT programs (CADD, GIS, NUMMODS, GPS, etc.), IT hardware and software acquired by the Corps, labor, and IT contractual services.

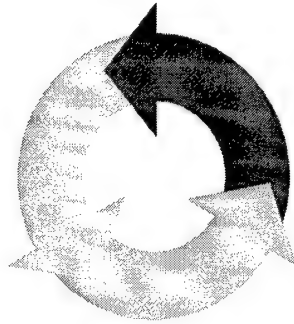
The systematic approach to manage the risks and returns of IT investments is based upon research on what leading organizations consider the primary focus in acquiring and managing information technology: **investment selection, control, and evaluation**. The process starts with prioritizing funding requests to maximize the value from use of scarce public resources and ends with clear evidence of positive net benefit to the public for dollars invested. The process involves balancing potential benefits, *based upon agency defined business value criteria*, against costs and risks and aligning strategic and tactical goals with proposed IT and automated information systems investments. USACE managers are responsible for asking the following questions about any potential investment in information technology before including it in the investment portfolio:

- Should the Corps be doing this work at all?
- Can someone else (government agency or private sector) do the work better?
- If not, is the work organized and being done the best way possible?



The following figure depicts the IT Investment Decision Process.

Select: How do you know you have selected the best IT/AIS projects?



Evaluate: Based upon your evaluation did you achieve the return on IT/AIS investment you expected?

Control: What are you doing to ensure that the IT/AIS projects will deliver the benefits projected?

The IT investment process and agency's designs, should match the agency's culture and organizational structure. The overriding objective of the process is for senior managers to be able to systemically maximize the benefits of their IT investments. While each phase of the investment process has its own requirements for successful execution, there are three overall organizational attributes that are critical to success. These shared, critical attributes are: (1) senior management attention, (2) overall mission/program focus, and (3) a comprehensive portfolio approach to IT investments.



Appendix A

IT/IM Strategic Planning Process

I. Making It Happen. Planning for the effective and efficient use of information technology within USACE is not a “once and done” activity. IT/IM strategic planning is part of an overall deliberative planning process that links sound information technology investments to maximized USACE employee performance and customer satisfaction. This process is depicted in **Figure 1**. The characteristics of the process are depicted in **Figure 2**.

IT/IM Strategic Planning Process

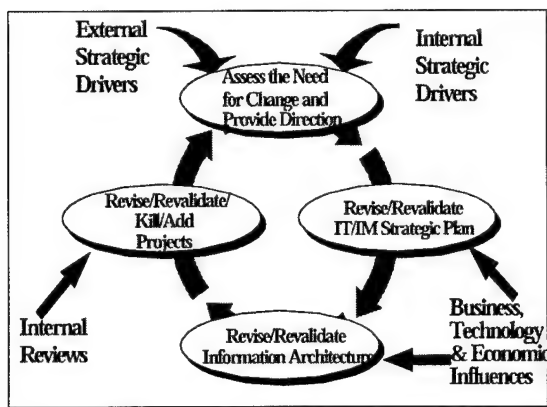


Figure 1

Characteristics of the Planning Process

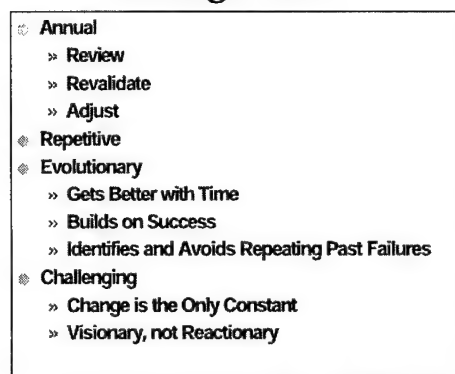


Figure 2

In a reasonably stable environment, annual reviews of the conditions that force USACE to change the way it does business and how it uses information technology to meet these new demands should suffice. Annual reviews and updates should also meet all statutory and regulatory mandates imposed on USACE. Annual reviews also provide sufficient time for projects to be defined, budgeted, initiated, reviewed and perhaps completed. On occasion, external influences will require the process to be executed semi-annually in order to address mission-critical issues. More frequent oversight of particular projects should be addressed through “traditional” program/project management mechanisms such as In-Process Reviews (IPRs) rather than through accelerating the IT/IM strategic planning process.

The process described in this appendix is oriented towards Headquarters USACE. A similar process will be followed in the MSCs, Centers, Laboratories and Field Operating Activities. Each USACE component will maintain a component IT/IM Tactical Plan consistent with the USACE IT/IM Strategic Plan. Component IT/IM Tactical Plans will inherit the goals, objectives and performance measures embodied in the USACE IT/IM Strategic Plan but will identify their own supporting strategies.

II. Getting Started. Strategic planning starts with a “corporate” recognition for a need to change the way USACE does its business. The dynamics that force any organization to change

are defined as “Strategic Drivers” as shown in **Figure 3**. Strategic drivers can be both external and internal. External drivers include new laws, new missions, new customers, budget reductions, etc. Internal drivers include changes in senior management, changes in employee skills as a result of downsizing, recognized need to change business processes, etc.

Assessing Strategic Drivers and the need for USACE to relook at its IT investment strategy is the responsibility of the Board of Directors (BOD), as shown in **Figure 4**. Based upon the scope and nature of the change, the Board will recommend a course of action that may be focused on improving the business processes of USACE or a change in the current IT Investment Portfolio.

Strategic Drivers

Strategic Drivers are defined as dynamics which force an organization into a particular set of actions, such as moving to new processes, new systems, new technology, new processes, or new ways of doing business. Typically, strategic drivers are imposed upon the organization either by management or by external sources such as market forces. Examples of such drivers could be economic conditions (i.e., a need for downsizing), new legislation which affects the organization, inability to meet mission requirements with existing resources, change of command, etc...

Figure 3

If the business process change is significant, it will be captured in a revised/revalidated USACE IT/IM Strategic Plan as shown in **Figure 5**. Minor changes to business processes may be accomplished through taskings or other directed assignments.

The Board of Directors is Responsible for Assessing the Need for Change Within USACE

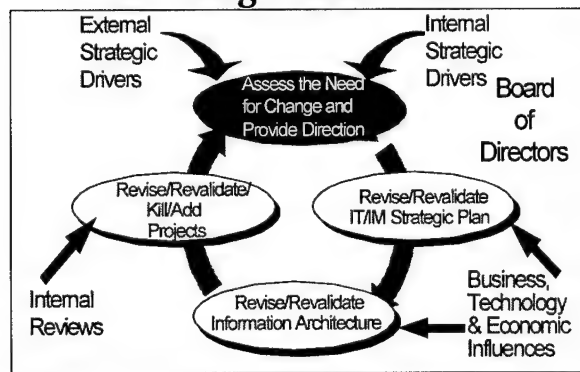


Figure 4

Board of Directors Decisions Drive Changes to Corporate Strategic Plan

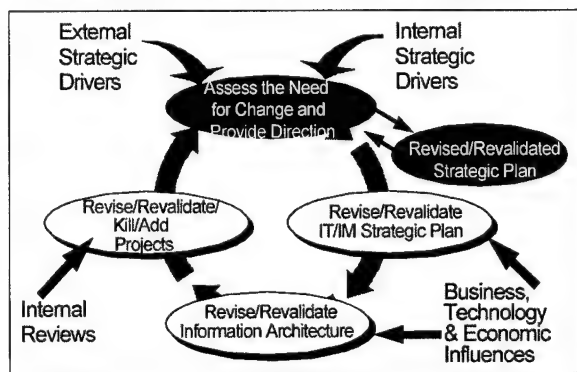


Figure 5

Changes to USACE business processes have an inevitable impact on the use of IT within USACE. A designated USACE CIO representative will work directly the impacted functional community to determine the extent of the change to the existing IT infrastructure and investment portfolio.

Changes to the IT Investment Portfolio directed by the Board of Directors will be addressed by the USACE CIO in conjunction with representatives of effected business communities.

III. Reviewing and Revising the IT/IM Strategic Plan. Under the scenarios described above, the USACE Chief Information Officer (CIO) will initiate a review of the USACE IT/IM Strategic Plan. This review will involve both the USACE technical and user communities, as shown in **Figure 6**. The purpose of the review is to determine if the BOD's recommendations impact any of the IT Goals, Objectives and Strategies contained in the current version of the plan, as shown in **Figure 7**. Other external influences such as changes in technology and funding will be considered during the review. The review will also provide the opportunity to assess the existing plan to determine if any of the goals, objectives and strategies have been met since the last review cycle. For example, replacing a major system or solving a Year 2000 (Y2K) problem may be identified as goals, objectives or strategies in the Strategic Plan. All actions related to replacing a major system or resolving the Y2K problem can be completed within designated time periods. If completed, the goal, objective and strategy should be removed from the plan.

**Changes to the IT/IM Strategic Plan
Are a Shared Responsibility**

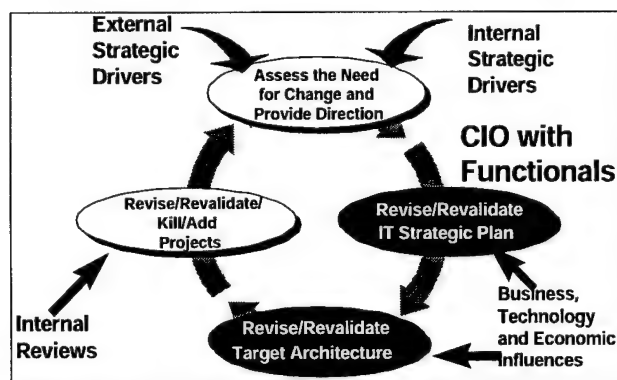


Figure 6

**All Elements of the IT/IM Strategic Plan
Are Reviewed for Possible Change**

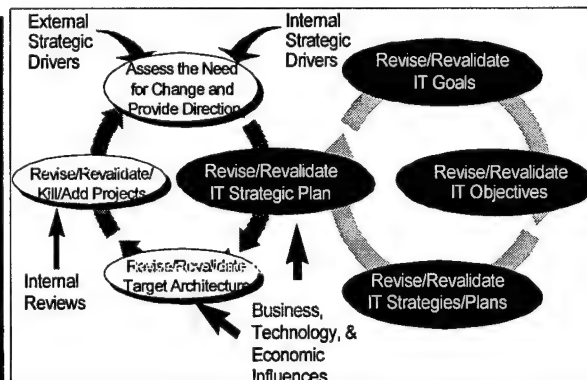


Figure 7

Periodic review of the IT/IM Strategic Plan ensures its currency with existing USACE business and IT needs and keeps it focused on the future. Some goals, objectives and strategies may be discarded due to changes in the overall DoD/DA IT environment, independent of any USACE activities. Changes to the IT/IM Strategic Plan will be coordinated with the functional communities through the HQUACE Information Resource Management Working Committee (IRMWC).

IV. Reviewing and Revising the Target Architecture. The USACE CIO is also responsible for maintaining the USACE Target Architecture.

The IEEE defines an architecture as "the structure and interrelationship of components, and the

principles and guidelines governing their design and evolution over time.” The ITMRA defines an Information Architecture as “an integrated framework for evolving or maintaining existing information technology and acquiring new information technology to achieve an agency’s strategic goals and information resources management goals.” The USACE Target Architecture is based on the IEEE definition and designed to conform to the ITMRA. The components of the USACE architecture are the Business; Information and Applications; and the Technology/ Infrastructure/IT Products and Services components. The target architecture also contains a desired “end-state” for USACE looking five to ten years in the future.

The IT/IM Strategic Plan can be looked at as a mechanism for capturing a high level view of “what” we have to do to get to the end-state while the Target Architecture captures the details of “how” we want to get there. The forces that make change necessary within USACE must be assessed for how both business processes and user information needs change so the supporting applications, technology/ infrastructure and IT products and services can be tailored to meet these new requirements. The high level view of how the Target Architecture is changed is shown in **Figure 8**. The detailed process for updating the Target Architecture will be addressed in separate documentation.

V. Reviewing and Revising Projects. The final step in the overall planning process calls for the review and revalidation of existing projects. Changes to existing projects are inevitable given the dynamic environment facing USACE. Delaying the fielding of a system to meet new user requirements must be factored against the need to provide some capability to the builders and users in the field. Rapid changes in technology, economics and other factors may even dictate the termination of specific projects or replacement with a new approach. (If we view the architecture as a journey as opposed to a destination, it’s never too late to turn back if we discover we have taken the wrong road.)

Reviewing the Target Architecture Follows the Review of the IT/IM Strategic Plan

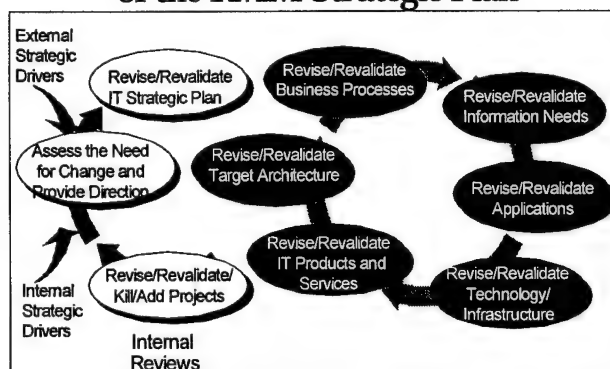


Figure 8

Functional Proponents Lead the Review of Current Projects to Incorporate Board of Director Guidance

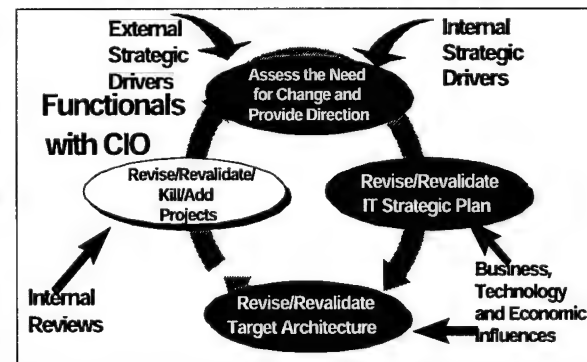


Figure 9



Functional proponents within USACE are responsible for developing, delivering, and maintaining applications. The CIO is responsible for integrating these efforts and ensuring conformance with USACE infrastructure standards. Changes to the IT/IM Strategic Plan and Target Architecture for impact on existing projects will be addressed by the functional proponents as shown in **Figure 9**. The need to change or confirm the direction of individual projects or programs is also addressed through IPRs and other management oversight mechanisms.

VI. The Information Technology Refreshment Process. Rapid and continuous change to information technology and the way it is used in USACE will be a major factor for the foreseeable future. Major changes to the supporting USACE IT infrastructure should be driven by the overall IT Strategic Planning Process. However, the USACE IT/IM community can not simply wait for issues to “filter down” from the corporate leadership before taking action. Routine modifications to the IT Infrastructure should be planned as part of a continuing evaluation process as depicted in **Figure 10**. This process requires full user involvement in evaluating and picking “preferred” technologies.

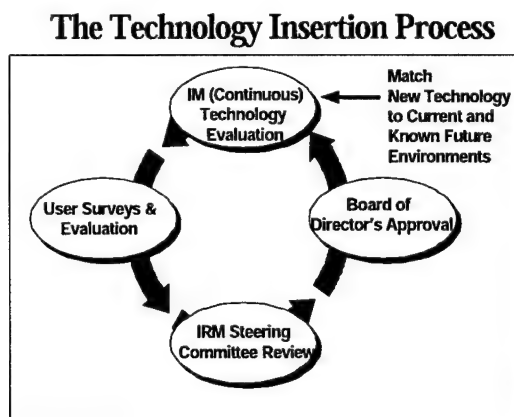


Figure 10

USACE will be presented with many new technologies that profess to offer greater functionality for end users. Priority should be given to evaluating only those technologies that clearly offer a significant improvement to the way USACE employees do their business and provide information to external customers.

VII. In Conclusion. Industry and government best practices indicate that the way to deliver information technology solutions that are both cost-effective and beneficial to overall business performance is to derive these solutions from successful implementation of a repetitive planning process. The planning process depicted in this appendix is designed to both identify the key technologies USACE needs to meet the challenges of the future and reinforce success. The overall process itself is designed to meet the evolving needs of USACE while ensuring a consistent way of planning for the future. The process is designed to manage change to the USACE IT infrastructure from many directions. It responds to top-down decisions made at the highest levels of USACE. The process also incorporates bottoms-up demands for new services driven by a vigorous collaboration between users and their supporting IT/IM staffs.

Appendix B

Corporate IT Initiatives

I. Introduction. At HQUSACE, the Directorate of Information Management and automated information systems (AISs) Functional Proponents undertake information technology initiatives that relate the Corps information technology environment and/or Command-wide AISs. Corporate IT initiatives are tactical/operational in nature, and focus on delivering near term improvements and enhancements to the Corps IT infrastructure environment or AISs.

II. Calendar Year 1998 Corporate IT Initiatives. The following are the major corporate initiatives for CY98:

A. Improve Communication Circuits. The Corps will add to the single T1 NIPRNET circuit in Washington, D.C. a T1 circuit to the west coast to better service the Pacific and west coast users/customers of the CEAP communications network and regional data processing centers. As Army level functional consolidations (e.g., HR Regionalization) continue, Corps customers are increasingly required to access systems deployed at Army installations. Adding NIPRNET connectivity will greatly enhance accessibility and response time in utilizing these systems. Both Korea and Japan will install backup circuits (via NIPRNET) for their locations in order to reserve dedicated CEAP circuits for mission critical applications, and will use NIPRNET for less sensitive World Wide Web access. During periods when the primary circuit is down, the NIPRNET circuit will serve as the fall back for mission critical applications. Various types of circuits are being evaluated to serve the Districts as backup in the event primary circuits failure. A cost effectively solution will be implemented to assure mission essential traffic is supported during periods of outages.

B. Standardize Office Automation and E-mail. The Corps will standardize on Microsoft Exchange server with the Outlook client for Electronic mail (E-mail) and personal information management (PIM) functions; i.e., calendar, file folders, tasks, etc. This standardization will enhance communications horizontally and vertically across the Corps, increase productivity, decrease message transmission time, and provide for collaboration and team building. Approximately one third of the Corps is already using Microsoft Exchange, and Exchange is a Defense Message System (DMS) compliant E-mail application.

C. Create Linkages to the DPW. The Corps will establish, where needed, communication links via local Army telecommunications facilities or dial up to connect Directors of Public Works (DPWs) with the CEAP communications network. This will give all DPWs access to USACE automated information systems, data, web pages, etc. Providing this capability will assure that every DPW that needs electronic mail or access to the web to work with the Corps has that ability. Also, it will assure that DPWs can be reached via electronic means.

D. Enhance Oversight of IT Cost and Acquisition. To support the Corps' Information



Technology (IT) Investment Portfolio, the Corps will integrate planning, budgeting, acquisition, and management of IT investments. The IT Capital Planning and Investment Decision Process will be implemented Corps-wide through the development of policy and guidance which ties this process to the management of the IT Investment Portfolio. An interface with the Corps of Engineers Financial Management System (CEFMS) will enable the actual expenditures for IT to be captured and compared to the plans and budgets for IT. The Directorate of Information Management (CEIM), in partnership with the Directorate of Resource Management (CERM), will standardize the resource codes used in CEFMS to record the actual IT costs for the Corps. Tying the IT plans, budgets, and actual expenditures together through standard resource codes for IT will complete the integration process.

E. Install Firewalls. The Corps continues to install upgrades (additional functionality and/or capabilities) to its communications routers. These upgrades are the initial steps necessary to implement better information system security, via what is commonly called "firewalls." New, replacement routers are being configured, and will be shipped to Districts as they are manufactured. Many sites have elected to increase their security capabilities by installing their own Sun Firewall One hardware/software. While this allows the site to further monitor their communications traffic, it requires manpower and expertise to operate. Implementation of the firewalls will provide a very high level of security and protect our most valuable systems and data from destruction or alteration from outside sources. The planned architecture will not impact current internal Corps communications nor communications outbound from the Corps. Communications entering the CEAP communications network from the Internet will be sent to specific systems that are intended for access from the Internet.

F. Complete Architecture 2000+. The Directorate of Information Management undertook the task of developing a new concept of an enterprise-wide information architecture as a replacement to the 1995 Architecture. The purpose of Architecture 2000+ is to: (1) Produce an evolving set of capabilities (the Target Architecture) to be used by non-technical and technical personnel in defining and developing future automated information systems which will meet the business needs of the Corps based upon best business practice architectural principles. For technical personnel, Target Architecture capabilities will be expressed in terms of standards, procedures, tools and components. For non-technical personnel, capabilities will be expressed in terms of IM products (what is to be provided) and services (how the products will be provided) that will support corporate business goals and objectives; (2) Produce a process for keeping the Target Architecture current and for allowing all USACE personnel to easily access and use architectural products; (3) Contribute to achieving the Chief of Engineer's Vision/Master Strategy/Corps Plus with respect to revolutionizing effectiveness; and (4) Satisfy the Government Performance and Results Act (GPRA) of 1993 and Information Technology Management Reform (Clinger-Cohen) Act of 1996 by identifying performance measures, investment strategies and other mandated requirements that influence the structure and direction of the Architecture.

G. Improve Internet Management: An Analysis and Evaluation of Web Use in the Corps.



Use of the World Wide Web (WWW), web technology, development of web-enabled applications, and web pages to disseminate information is growing rapidly within the Corps. The Corps executive leadership is concerned about the cost and value of the investment being made in this area, and whether or not the Corps Internet/Intranet infrastructure environment is being managed as a "managed environment" to achieve both local and corporate objectives associated with replacing printed media, creating dynamic links to real-time data, and integrate data from multiple sources. Consequently, the Directorate of Information Management will undertake an analysis of the Corps Internet/Intranet infrastructure environment to identify costs and whether changes need to be made in the infrastructure to maximize the resources used to acquire, develop, operate, and maintain it. As part of this analysis and evaluation, a comparative analysis of how the Corps is using the WWW will be made against industry trends to see if the Corps is investing and using Web technology and web pages appropriately. Also, the Corps current Internet policy will be reviewed and updated as applicable.

H. PROMIS-- Improved Overseas Response Time. Deploying the Program/Project Management Information System (PROMIS) application server in the Corps of Engineers Automation Plan (CEAP) Regional Data Centers and the PROMIS client OCONUS resulted in unacceptable response times. To dramatically improve PROMIS OCONUS response times, the PROMIS Functional Proponent and CEAP Program Manager are using WinFrame technology to co-locate the PROMIS application server and PROMIS client in the CEAP Regional Data Centers.



Appendix C

IT Capital Planning and Investment Decision

I. Introduction. This appendix describes the processes involved in the management of the Information Technology (IT) Investment Portfolio through the IT Capital Planning and Investment Decision process. This process integrates the principles and techniques for planning, budgeting, acquisition, and management of IT investments into a single IT Capital Planning and Investment Decision process to ensure that IT investments contribute to the achievement of the Corps' strategic goals and objectives.

The Corps needs to have a disciplined IT Capital Planning and Investment Decision process that addresses project prioritization, risk management and other difficult challenges posed by the acquisition and management of IT investments. An effective IT Capital Planning and Investment Decision process uses long range planning and a disciplined budget process as the basis for managing the portfolio of IT investments to achieve performance goals with the maximum benefit and least risk to the government.

The Corps IT Investment Portfolio contains IT projects in every phase (initial concept, development, or operations and support) and for every type (mission critical, cross-functional, infrastructure, administrative, and research and development) of IT. The Corps IT Investment Portfolio will collect and maintain data on IT projects (AISs), IT programs (CADD, GIS, NUMMODS, GPS, etc.), IT hardware and software acquired by the Corps, labor, and IT contractual services.

Recent legislative acts have focused on improvements to the management processes, including the selection and management of IT resources. The Clinger-Cohen Act of 1996 introduces more rigor and structure into how organizations' approach the selection and management of IT projects. The Act requires:

- The implementation of a process for maximizing the value and assessing the risks of IT acquisitions. This IT investment process is to be integrated with the processes for making budget, financial, and program management decisions.
- The Chief Information Officer (CIO) to be responsible for providing advice and other assistance to senior managers to ensure that IT is acquired and information resources are managed in a manner that implements the policies and procedures of this act, consistent with the Paperwork Reduction Act of 1995.
- The CIO to be responsible for developing, maintaining, and facilitating the implementation of a sound and integrated IT architecture which is an integrated framework for



evolving or maintaining existing IT and acquiring new IT to achieve the Corps' strategic and IT/IM goals and objectives.

- The CIO monitor the performance of IT programs/projects, evaluate the performance of those programs on the basis of applicable performance measures, and advise on whether to continue, modify, or terminate the IT program or project.

A key goal of the Clinger-Cohen Act is that organizations should have processes and information in place to help ensure that IT projects are being implemented at acceptable costs, within reasonable and expected time frames, and are contributing to tangible observable improvements in mission performance.

II. Management, Process, and Portfolio Environments.

A. The IT Investment Management Infrastructure. The Clinger-Cohen Act of 1996 requires the establishment of an IT investment management infrastructure which establishes clear lines of authority, responsibility and accountability for the management of IT investments. The CIO, in partnership with the business units, must establish the IT Investment Portfolio and develop the screening process. This process ensures that programs/projects being submitted for funding are compared against a uniform set of screening criteria and thresholds in order to determine whether the projects meet minimal requirements and to identify at what organization level the projects should be reviewed. The costs, benefits, and risks of all IT projects - proposed, under development, operational, etc.- are then assessed and the projects are compared against each other and ranked or prioritized. This ranking criteria includes cost, risk and benefit factors, as well as an assessment of how well the project meets mission needs.

The IRM committee, at the local level, and the Board of Directors, at the corporate level, make decisions about which programs/projects to select for funding based on mission needs and organizational priorities. The IT programs and projects that are selected for funding make up the portfolio of IT investments. The HQUSACE Information Resources Management Working Committee (IRMWC) performs a technical review of the IT Investment Portfolio to ensure compliance with the USACE IT/IM Architecture and Army's Joint Technical Architecture. The Board of Directors reviews the IT Investment Portfolio for affordability and is the executive level review board responsible for final approval of the Corps IT Investment Portfolio. On a periodic basis, decisions are made on the IT investments' performance in meeting strategic goals and objectives within budget limits..

B. IT Capital Planning and Investment Decision Process. The CIO, in partnership with the business units, should ensure that the principles of business process reengineering have been applied, and that the business process has been streamlined as necessary, prior to the planning phase for IT investments. Included in this process is an analysis of whether or not there needs to be an IT investment to enhance the performance of the business process and how this investment will contribute to improvements in mission performance. The IT Capital Planning and Investment



Decision Process follows this assessment. This process has three phases which occur in a continuous cycle. The Selection, Control and Evaluation phases link IT investment decisions to Corps strategic goals and objectives and business plans.

The Selection phase creates a portfolio of IT investments that maximizes mission performance, using a standard set of criteria for consistent comparison of IT projects/programs. The Selection process ensures that the IT projects selected will best support mission needs and identifies and analyzes a project's risks and proposed benefits before a significant amount of project funds are spent.

During the Control phase, senior management monitors the process of ongoing IT programs/projects against projected cost, schedule, performance and delivered benefits. The Control phase ensures that as a project is developed and investment costs rise, that the project continues to meet mission needs. If it does not or if problems have arisen, mitigating steps are quickly taken to address the deficiencies. Decisions made during the Control phase may include canceling the project, modifying it to better meet mission requirements, accelerating development of the project, or continuing its development as planned.

The Evaluation phase determines the actual return on investment of an implemented IT investment against the Corps' mission and programs and adapts the existing process to reflect lessons learned. Once IT projects have been fully implemented, actual versus expected results are evaluated to assess the project's impact on mission performance and to identify any changes or modifications to the project that may be needed. The control and evaluation phases are conducted throughout the year and their results are fed into the selection phase.

C. Information Technology Investment Portfolio System (ITIPS). The IT Capital Planning and Investment Decision Process will be facilitated through use of the Information Technology Investment Portfolio System (ITIPS). The Corps has begun the process of integrating its IT Capital Planning with its inventory of IT to form a portfolio of IT investments. Currently the Requirements Statement Management System (RSMS) serves as the Corps' plan for IT capital assets. Requirement Statements (RS) describe the IT investment being planned and, after validation, are used to track the acquisition costs of the IT project. This process is being integrated with the Automated Information System Inventory System (AISIS) which is being expanded to contain the inventory of all IT investments. The integration of RSMS and AISIS forms the foundation of ITIPS and directly supports the Selection, Control and Evaluation of IT investments as required by the Clinger-Cohn Act. ITIPS is a key tool to support Corps' senior executives as they determine priorities and make decisions on which IT projects/programs will be funded during the year.

The IT Capital Planning and Investment Decision process will provide consistent decision criteria to make comparisons of costs, benefits, risks, and returns across IT project/programs proposals, and provide Corps' senior executives with the performance measurements needed to take action to continue, modify, or cancel them.

Appendix D

Emerging Information Technologies

I. Introduction. This appendix provides a forum for discussing emerging technologies in the global market and their impacts upon everything they touch both directly or indirectly, and is intended to foster thinking and enhance the planning needed to acquire the information technologies that will improve the Corps' mission capabilities and performance. The challenge will be knowing what to adopt, what to ignore and when to implement. In the private sector, companies that wait until an emerging technology is mature or established run the risk of being left behind by their competitors. In the public sector, government agencies will fail to satisfy the taxpayer's demand for government organizations that "work better and cost less."

Warning: This appendix uses terminology that may not be entirely familiar to non-IT professionals.

The advances being made in information technology opens up new and exciting future possibilities for doing our business more effectively, not only internally but with Corps customers. The Corps needs to rely more and more on technology to dramatically alter its business processes and compete in a global environment. IT is the key enabler of the improvements that will simplify, speed, or eliminate tasks and activities within our business processes and for improving the quality of the Corps' products and services.

The post-Cold War environment has and will continue to change how Department of Defense's military services operate and will need to operate in the future. In response to the Nation's changing security environment and advances in technology, innovative ways must be found to serve the warfighter (and peacemaker) faster, better, and cheaper.

II. IT -- "The Key Enabler Driving Change."

A. The Work Environment. If the pace of change for new information technology during the past five years keeps stride for the next five to ten years, the impacts will profoundly change the cultural and social fabric of where and how work is performed, how companies organize, and how business transactions between organizations and individuals take place.

Within the next decade, most of the workforce will come from a generation or two born and weaned in the age of electronic games, digital technology, world wide web surfing, and diverse lifestyles. This will challenge organizations to offer a work environment that attracts and retains those individuals in our society who have the information technology knowledge and skills needed for businesses and government agencies to function effectively in an electronically connected, global community that functions in a global digital economy.



Organizations will not, out of necessity, be bound to formal hierarchical structures but can function as informal networks. The information needed to perform work will flow along information highways to everyone at one time rather than being filter through managers. Subject matter experts will collaborate together in a virtual team environment to exponentially increase the application of knowledge to solve problems or resolve issues. The resources to solve problems will not be limited by time and distance barriers-- the geographic boundaries that typically constrain organizational effectiveness will disappear.

The practice of a normal, eight-hour workday will be replaced as workers will no longer be bound to their desk or office. Alternative workplaces, such as the home, and habits will change as telecommunications will enable workers to adopt new work lifestyles. As economies become more global in terms of customers, competitors, and knowledge workers, so will the typical work hours. Customers will expect services to be convenient to their time schedules, and not to the organizations' local time.

B. Emerging Information Technologies. In the private sector, information technology and information service providers are scrambling to position themselves to take advantage of new emerging information technologies, and the capabilities these technologies offer business and government. Telephone, long distance carriers, cable, publishing, entertainment companies and even power utilities are merging, acquiring, or creating strategic alliances to take advantage of communications and electronic advances.

As communications and electronic advances evolve and are implemented across the private and public sectors, the reality of the "electronic workplace," with offices and virtual offices, will be set in motion. The electronic workplace will embrace three areas of collaboration for sharing information and ideas. The three areas are:

- Shared information and ideas. This is where E-mail, discussion databases, such as Lotus Notes, digital images/libraries, data warehouses, and complete documents stored in an accessible repository promote the sharing of information and ideas between workers.

- Real-time shared ideas. This is where people will gather together using "white boards" to partner in the creation process in real-time using synchronous communications.

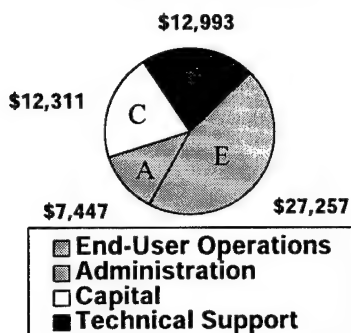
- Real-time face-to-face. This is where desktop teleconferencing will allow individuals and small groups to interact with one another on a real-time basis.

The information technology industry has been living with Moore's Law for a number of years and has seen tremendous increases in performance, particularly with regard to the "cost to performance ratio" when comparing newer technology with its older counterpart. If Moore's Law accelerates, it will accelerate the replacement cycle for equipment and add new uses and users. Personal computer (PC) users have generally accepted the fact they will have to throw away their old PCs every three years and replace them with new PCs. As the replacement cycle



shrinks, organizations and users will have to rethink their decisions and look at either retaining their older technology longer or seek out alternatives such as substituting network computers or JAVA workstations.

The GartnerGroup has done an industry-wide analysis on the Total Cost of Ownership (TCO) for a Windows95 PC. For a five year period, the TCO for a Windows95 PC is \$59,438.



Network computers (NCs) offer organizations an attractive alternative for lowering their TCO. Network computing is a new client server model, and NCs can be operationally mixed with other PCs. Due to an estimated annual life cycle cost savings between 35% and 40% for a NC as compared to a Windows95 PC, enterprises will start evaluating the tradeoffs of integrating NCs in their information technology infrastructure environment.

By 2010 or earlier, the ubiquitous implementation of emerging or evolving information technologies into business processes and/or applications includes wireless data communications, desktop videoconferencing, intelligent agents, speech recognition, electronic cash, interactive Web/TV, smart cards, biometrics, intelligent messaging, push technology, and data mining. With regard to speech recognition, in three years it will be a standard part of the personal computer/workstation environment.

The delivery of information via information technology has improved dramatically over the years but largely depends on it being “pulled” from its source by its user. The advent of “push” technology allows for the dissemination of information to a single user or groups of users over a network. With push technology, information content can be automatically delivered. The three methods of “pushing” information content include:

- Polling/unicasting,
- Broadcast/IP multicast, and
- Persistent connection.

Push technology is attractive to organizations because it can deliver timely, relevant information to decision makers and workers. By delivering information, workers no longer have to “go out and get things,” it comes to the worker thus adding productivity to the workday. With the installation of push technology, organizations must implement information content management practices to avoid the occurrence of an “information avalanche.”

III. Opportunity Areas for Applying IT.

Knowledge Management. There is a saying, "Data becomes information, which becomes knowledge and knowledge becomes wisdom." Knowledge is important to business; and, with the advances in information technology, organizations are presented with the opportunity to harness the collective knowledge of its employees by applying technology. Knowledge management is a discipline applied to maximize the return on the intellectual capital held within an organization. Mr. Jack Welch, General Electric's Chairman, wrote in his 16th annual letter to GE stockholders that organizations "should reward the finding and sharing of ideas -- even more than their origination."

Knowledge management initiatives generate a reliable stream of business benefits over time. These benefits have a full range of short-term and strategic impacts:

- People have instant access to information resources through the Internet and other information highway networks using browsers and search tools;
- Information can be stored easily in a variety of media and the cost of storing it is decreasing each year;
- Effective knowledge reuse boosts productivity and reduces cost;
- The organization moves faster in such areas as product development, distribution cycle times, and decision making; and,
- Strategic advantages are created over time by employees who learn to use the new tools for harnessing experts knowledge and creating new knowledge.

Advance knowledge management systems are becoming as important to business as major capital projects. Executives appreciate the business value of knowledge that is easier to apply on the job, quicker to access, more widely shared and more easily updated and improved. The greatest challenge to an organization will be cultural, not technology. IT is the vital enabler for harnessing the power of the organization's intellectual capital. All of which means that knowledge becomes a more valuable strategic resource.

Acknowledgement: GartnerGroup documents provided the source for much of the information in this appendix.

Appendix E

Performance Measurement

I. Introduction. Laws and Executive Branch guidance affecting performance measurement is growing. The common theme throughout this body of performance measurement knowledge is accounting for how resources are being expended in ways that produce successful outcomes defined in results-oriented terms. The key question that will be asked by Commanders across the Corps at every level is simply, "Are the expenditures we are making on information technology (IT) products and services reasonable given the expected/actual improvements in mission and/or program performance?"

The old adage is that you cannot manage what you cannot measure. Business process and program managers, in partnership with their IT professionals, must demonstrate a proven track record in delivering interim and final IT results whose value can be measured in both quantitative and qualitative performance terms. In the near future, this will become a requirement for funding.

The Information Technology Management Reform (Clinger-Cohen) Act of 1996 has specific provisions (Sections 5112(c), 5123(3) and 5125(c)(2)) relating to IT performance measurement. More than ever, Federal agencies will be asked to demonstrate how their IT investments are supporting their programs. This will focus attention on more than just the cost and schedule of IT projects, and will include tangible improvements in such things as service delivery, employee productivity, cost savings, and more timely, accurate decision-making.

While it is important, and necessary, to analyze IT investments in the IT Capital Planning and Investment Decision process, it is equally, if not more important, to document whether promised benefits failed to be achieved, were met, or had been exceeded and then reported to management; i.e., local Information Resource Management Steering Committee, Commander, and/or USACE Board of Directors.

II. Eight Steps for Developing and Using Information Technology Performance Measures.

The General Services Administration's (GSA) Office of Governmentwide Policy has developed a guide to help those who want gain an understanding of performance measurement and for those who develop and use performance measures for information technology. This guide is available on the World Wide Web at <http://www.itpolicy/gsa.gov>. The eight steps identified below are documented in detail in the guide and will only be highlighted herein to give an overview on the process of creating and using IT performance measures. The GSA guide is not the only source of information on IT performance measurements but generally reflects what can be found in other sources, such as the National Academy of Public Administration's *Information Management Performance Measures* and the Association for Federal Information Resources Management's *The Connection: Linking IRM and Mission Performance*.

A. Step 1. Link IT Investments/Projects to Goals and Objectives. The effective

measurement of an IT investment's contribution to agency accomplishments begins during the planning phase. Done properly, IT investment planning is based upon the agency's mission and strategic business plan(s). IT organizations build partnerships with program offices and functional areas to define IT investments and/or projects that contribute to the agency's goals and objectives. Linking IT investments/projects to goals and objectives can be done using a framework known as the "Balanced Scorecard." The commonly defined Balanced Scorecard consists of four perspectives that provide a comprehensive view of a organization's business. The perspectives include Customer, Internal Business Process, Financial, and Innovation and Learning. The Balanced Scorecard in Step 2 also serves as a framework to assess performance. While the Balanced Scorecard framework approach has not been implemented within the Corps, it is being tested in the Southwestern Division (SWD), as a Test Division, to devise improved measures of effectiveness for many of its initiatives, and has been adopted by several organizations within DoD and Army. At this time, the Corps will link its IT performance measures to its Vision and Master Strategy (Corps Plus) goals.

B. Step 2. Develop Performance Measures. To assess the efficiency and effectiveness of IT investments/projects, select a limited number of meaningful performance measures with a mix of short- and long-term objectives and/or initiatives. For large IT investments/projects, the project manager or another key individual leads a team to develop IT measures. Measure the outcomes of the IT investment, not just its cost, timeliness and quality. An outcome is the resulting effect of the IT investment on an organization. Examples include measurable improvements in the quality and delivery of the organization's services and products.

To develop performance measures, determine the objectives of the IT investment/project; decide how requirements will be met; know the purpose of the results; and understand why the results matter. Measure that which is most important. Organizations, and elements of organizations, will improve the quality of their measures and ensure their acceptance if their IT organizations develop and nurture partnerships with customers and stakeholders. Effective performance measures reflect a strong customer focus.

C. Step 3. Establish Baseline to Compare Future Performance. Baselines enable organizations to determine whether performance improves or declines as a result of an IT investment. Valid baselines are documented, recognized and accepted by customers and stakeholders. Standard agency reports can serve as the baseline if, and only if, the reports apply to the indicators chosen. If no baseline exist, then the performance measures establish the baseline.

D. Step 4. Select IT Investments/Projects with the Greatest Value. In today's tight budget environment, organizations can only fund a limited number of IT investments/projects. Consequently, organizations need to select investment/projects that provide the greatest value. Value is based on the estimated economic return of an IT investment plus its estimated contribution to an organization's business priorities. To select the IT investments/projects IT with the greatest value, establish an Investment Review Board (IRB) (see Appendix C) to estimate the value and risks of each investment. The IRB should comprise the major stakeholders from the organization's core functional areas and program offices.

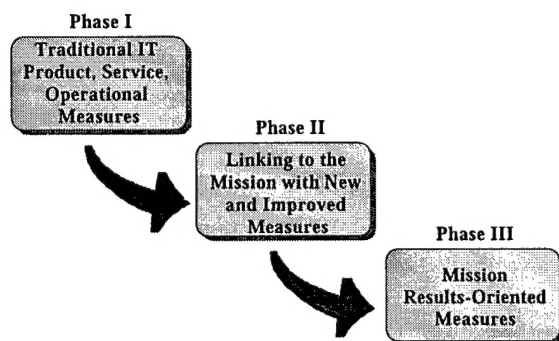
E. Step 5. Collect Data. The optimal time to focus on the data needed for the chosen indicators is during Steps 2 and 3. Organizations need to ask: "What data are needed to determine the output of the IT investment/project? What data are needed to determine the effectiveness of the project?" The data used will depend upon availability, cost of collection and timeliness. Accuracy of the data is more important than precision.

F. Step 6. Analyze Results. After obtaining results, conduct measurement reviews to determine if the IT investment/project met the objectives and whether the indicators adequately measured results. A key question is: "Do the results differ from what we expected?" During reviews, seek ways to improve performance, refine indicators and identify lessons for future projects. The most useful performance reports track results over time and permit identification of trends.

G. Step 7. Integrate with Management Processes. To assure that results improve performance, integrate them with existing management processes. If the results are not used, no one will take the measurement process seriously. Laws require Federal agencies to submit performance reports with their budget submissions. Because it may take years to realize a project's results, agencies face the challenge of identifying results in their annual budget submissions. Within the Corps, at every level, results are furnished to organization's the Commander, executives and senior managers, and Information Resources Management Steering Committee (or Board of Directors).

H. Step 8. Communicate Results. The organizational element responsible for performance measures should take the initiative to communicate results internally to improve coordination and increase the focus of workers and managers. Leverage results by sharing them with OMB and Congress to obtain support and continued funding. Communicate results with customers and the public to foster and sustain partnerships.

III. Stages in IT Performance Management. Performance management literature and organizational case studies reveal that organizations tend to progress through three different phases, and develop greater maturity and experience in defining and using IT performance metrics as they go along. As an organization gets started, it need to focus on getting good at the basics--



measuring IT products and services for their quality, productivity, adherence to accepted standards, and cost effectiveness. Once this capability is understood and measured, the focus shifts to improving IT management processes, correcting deficiencies, and beginning to link operational performance with mission and/or program performance. In the final phase of maturity, IT expertise, products, and services are applied directly to mission requirements in results-oriented terms.

IV. Implementing Performance Based

Management. Performance measurement requires an investment in resources. An organization's management staff must dedicate appropriate resources up-front to properly set up their measurement structure. Initially more resources will be required to develop a knowledge and skills base and instill performance based management methods. Over time as an organization learns how to develop and use performance measures, less resources will be required.

The task of linking IT investments/projects to organizational outcomes (whether through a Balance Scorecard approach or to business strategic goals) is hard to conceptualize and recognize initially due to the inherent ambiguity of outcomes. Time and experience will be required before truly meaningful IT performance measures can be developed and used to demonstrate the value of an IT investment to one or more Corps business area outcomes.

The amount of resources and time necessary to develop measures will depend on the scope of the performance measurement effort itself, the partnership between the business and IT technical communities, quantity and quality of available data, knowledge competencies of the developers, and the level of proactive involvement by management. Executive and senior managers must support and participate as well as encourage and foster a performance based management culture if mission and/or program performance is to be improved. An excellent source for performance measurement training is the Information Resources Management College (IRMC), National Defense University (NDU), at Fort McNair, Washington, D.C. The IRMC teaches a *Measuring Results of Organizational Performance* course which is "free" to DoD employees.

V. Command Consolidated Guidance (CCG). The Directorate of Information Management identified three performance indicators for the Command Management Review. The first indicator deals with office automation (OA) products, local area network (LAN) operating systems, and electronic mail (E-mail) systems. The second indicator focus on the number of workstations with World Wide Web (i.e., Internet) access, and the last indicator measures E-mail message point-to-point delivery time.

Each of these performance measures has its own goal, but all relate back to boarder areas of concern for improving Corps mission and/or program performance or improving business processes. Overall success is achieved when each indicator reflects a "green" status.

VI. Corporate IT Initiatives. Appendix B identifies eight Corporate IT initiatives for calendar year 1998. For each of these initiatives, the assigned office of responsible has identified quantitatively and/or qualitatively the initiatives "measure of success."

A. Improve Communications Circuits.

B. Standardize Office Automation and E-mail. This initiative has been included as a performance indicator in the Command Management Review. Initial measurements will show percentage usage by Office Automation (OA) and E-mail packages by MSCs, Districts, Centers, Labs and FOAs. As this data is presented to the Board of Directors, decisions will be made that establish the measurements needed to monitor USACE migration towards a specific OA and E-mail packages.

C. Create Linkages to the DPW.

D. Enhance Oversight of IT Cost and Acquisition. To enhance the management oversight for IT investments and their acquisition, the three separate processes of planning, budgeting, and execution (i.e., actual costs) will be integrated. This will eliminate the manual process currently used to analyze, integrate and compare data. The effort involved to collect and analyze planning, budgeting and cost data is labor intensive, and integration will reduce the effort considerably. With the integration effort, changes will be made to improve how IT costs are captured in the Corps of Engineers Financial Management System (CEFMS) and additional data elements will be added to the Requirement Statement Management System (RSMS) and Automated Information Systems Inventory System (AISIS). The integration effort is expected to be completed no later than 31 December 1998, and, when done, is expected to reduce data entry requirements by twenty percent and data analysis by twenty-five percent.

E. Install Firewalls.

F. Complete Architecture 2000+. The two main results of Architecture 2000+ are the USACE Information Architecture and the Architecture Maintenance Process.

The USACE Information Architecture is an integrated framework for evolving information resources to achieve the Corps strategic goals. As an integrated framework, it consists of:

- ❖ Results descriptions;
- ❖ Business, information, applications, and technology components;
- ❖ Component interrelationships;
- ❖ Principles and guidelines governing component design; and,
- ❖ Processes and services to build components.

The USACE Information Architecture provides the structure and guidance needed to develop the capability the Corps will need to successfully operate in the future. This capability is stated as: The ability for authorized users to transparently create, retrieve, update, delete, exchange and share multi-media information anywhere, anytime.

Architecture 2000+, as defined above as an integrated framework, will be completed no later 31 December 1998. The execution of the USACE Information Architecture as related to performance measurement will be a following on activity build around the following three criteria:

Does the Architecture contain all of the components and guidance needed to satisfy the business requirements of the Corps?

Does the Architecture and its associated maintenance process allow the IT professional to deliver implementable IT solutions that satisfy the business needs of the Corps?

Does the Architecture maintenance process adjust to effectively handle new and changing business and IT requirements?

G. Improve Internet Management: An Analysis and Evaluation of Web Use in the Corps.

USACE websites, web pages and accessibility measurements fall within two categories: (1) Compliance with DoD, DA, and USACE Internet-related policies and (2) Internet access provided to USACE employees. Category 1, Compliance, includes such verifiable criteria as standardized Command home page banners, appropriate use of logos, appropriate and complete point of contact information, presence or absence of Information, News, and Organization links on Command home pages, and reporting changes in Command Webmaster assignments. Category 2, Access, will measure the extent to which USACE maximize and promote business use of the Internet by their employees and has been included as a performance indicator in the Command Management Review. Measurement will show percentage usage by Office by MSCs, Districts, Centers, Labs and FOAs.

H. PROMIS-- Improved Overseas Response Time. Acquire and install WinFrame technology for overseas sites no later than 30 Apr 98. Measure response time to open and save a project version before and after WinFrame implementation. Reduce response time to open or save a project version by 75% where $\% \text{ reduction} = (\text{time before} - \text{time after}) / \text{time before}$.

